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**LEADERSHIP AS A SYSTEMIC COMPETENCE
OF FUTURE COMPETITIVE EXPERT**

Abstract. *The article is dedicated to improving the quality of the preparation of future competitive engineers in higher education. The paper presents the author's view of the structure and criteria of leadership competencies. The focus is on the ways to develop leadership competencies in the academic environment and modern methods for assessing leadership skills. The significance of leadership as a systemic competence of the future specialist was introduced on the basis of the theoretical and practical experience in pedagogy, psychology and management. The results of psychological and pedagogical research on leadership competencies development of future professionals in the academic environment of the technical university are discussed in the article.*

Keywords: *academic environment, high education, competitive specialist, criteria of leadership, leadership skills, leadership competence, systemic competence, leadership structure, development techniques, teaching techniques.*

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ЛІДЕРСТВО ЯК СИСТЕМНА КОМПЕТЕНТНІСТЬ МАЙБУТНЬОГО КОНКУРЕНТОСПРОМОЖНОГО ФАХІВЦЯ

Анотація: Статтю присвячено питанням підвищення якості підготовки сучасних конкурентоспроможних фахівців у вищій школі. У роботі представлений авторський погляд на структуру та критерії лідерських компетентностей. У центрі уваги перебувають способи розвитку лідерських компетентностей в академічному середовищі та сучасні методи оцінки лідерських здібностей. На підставі досвіду теорії і практики педагогіки, психології і менеджменту доведена значущість лідерства як системної компетентності майбутнього конкурентоспроможного фахівця.

Обговорюються результати психолого-педагогічного дослідження спрямованого на розвиток лідерських компетентностей майбутніх фахівців в освітньому середовищі технічного університету.

Ключові слова: академічне середовище, вища школа, конкурентоспроможний фахівець, критерії лідерства, лідерські здібності, лідерські компетентності, системна компетентність, структура лідерства, способи розвитку, технології навчання.

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ЛИДЕРСТВО КАК СИСТЕМНАЯ КОМПЕТЕНТНОСТЬ БУДУЩЕГО КОНКУРЕНТОСПОСОБНОГО СПЕЦИАЛИСТА

Аннотация. Статья посвящена вопросам повышения качества подготовки современных конкурентоспособных специалистов в высшей школе. В работе представлен авторский взгляд на структуру и критерии лидерских компетентностей. В центре внимания находятся способы развития лидерских компетентностей в академической среде и современные методы оценки лидерских способностей. На основе опыта теории и практики педагогики, психологии и менеджмента показана значимость лидерства как системной компетентности будущего конкурентоспособного специалиста. Обсуждаются результаты психолого-педагогического исследования, направленного на развитие лидерских компетентностей будущих специалистов в образовательной среде технического университета.

Ключевые слова: академическая среда, высшая школа, конкурентоспособный специалист, критерии лидерства, лидерские компетентности, лидерские способности, системная компетентность, структура лидерства, способы развития, технологии обучения.

Problem setting. Economic, social and political changes in the country under conditions of market relations impose new requirements for engineering education. Only competent and confident professionals who are capable of continuous self-development are able to ensure the competitiveness of modern industry. In this regard, there is an objective necessity to improve higher technical education aimed at the development of a conscious personality who strives for self-education, self-development and self-realization in professional activities.

Nowadays the demands of labour market and work environment have been dramatically changed in all the fields of economy. As a result, modern engineers in addition to technical skills must be able to understand project goals and have the ability to accomplish them with available

resources [1-3]. In addition it is getting essential to work across borders, cultural boundaries, and social contexts, being able to work non-engineers. Leadership is a core competence to be developed and improved in engineering study process to meet these demands [4].

The bulk of research dedicated to engineering education reveal the crucial role of leadership skills as one of the “soft skills” not only in engineering management, but in daily practice [9]. Leadership is defined in Tuning project as a systemic competence that requires skill in other areas in order to be exercised effectively and be developed in the final years of a degree course [10]. In terms of engineering education three fundamental traits of leadership are mentioned: capacity to influence, anticipating the future or capacity of vision and contributing to the development of others [11]. These traits can be found in many current definitions of leadership drawn from educational and business sources.

Recent research and publications analysis.

The problems of increasing efficiency of modern higher engineering education have been of current interest to the scientists such as V. Andrushchenko, V. Grinyova, G. Gurevich, I. Prokopenko, A. Sushchenko, T. Sushchenko A. Trotsky and others. The issues of preparing future engineers have been studied by S. Dansheva., O. Ignatyuk, O. Kovalenko, M. Lazarev, A. Meletsenek, A. Romanovsky, N. Saenko, A. Slobodyanyuk, E. Chugunova etc.

In recent years, there has been growing interest in leadership skills development in modern society which has been studied by V. Kremen, S. Kalashnikova, V. Lugovoi, V. Moroz, S. Moroz, A. Romanovsky, Yu. Chalaya [1,2,5,8 et al] The bulk of research represents educational leadership issues in three interrelated aspects such as leadership in education, leadership for education, educational leadership. Therefore, the various aspects of educational leadership have been treated by Zh. Bogdan, T. Hura, L. Gren, B. Holoveshko, O. Ignatyuk, O. Kvasnyk A. Knysh, S. Resnick, A. Romanovskiy, I. Ripko, N. Sereda, T. Solodovnyk., A. Tinyakov, V. Shapolova and others [3,5-7,11 et al.].

Analysis of aspects of previously non-defined problem.

However, the significant attention of scientists to the leadership development is not necessarily the evidence of comprehension of educational leadership essence and the ways to overcome the challenges in leadership development as a systemic competence of future competitive specialist. Thus, in modern global economy these issues are getting more and more relevant and require an urgent solution.

In addition, there hasn't been enough previous research where leadership is treated as a systemic competence. That is why, it remains the focus of an article.

The aim of the article is to analyse and clarify the structure of leadership competencies in the academic environment of the technical university and modern methods of leadership skills assessment. The chosen teaching methods and strategies should be tested on the students with following analysis of the obtained results.

Statement of the main material.

Despite all the research in humanities and social studies related to theory of leadership, nowadays there is no unified concept of leadership, its structure and assessment criteria. At the same time, the declared necessity of leadership skills development in modern higher education requires special teaching methods, structural assessment criteria and a proper way to implement them to academic curriculum.

Assessment of leadership skills. A leadership skills assessment is essential to any engineering course as a way to evaluate the current leadership strength and develop the study program components. One of the main drawbacks of common ways to evaluate leadership skills is the prevailing use of self-reported assessments. However, it is significant to define the proper criteria, which could be useful for both self-reported and

observer-reported assessments. A well-organised system of criteria in leadership competence assessment was introduced by Sánchez and Ruiz [11], in which three levels of complexity have been established. On the base of this research, with a consideration of other views [6-8,11-13] to structure leadership competences, the authors developed the three-level structure and criteria of leadership skills (Fig 1). The criteria for assessing progress in this competence are set out in the different indicators for each established level.

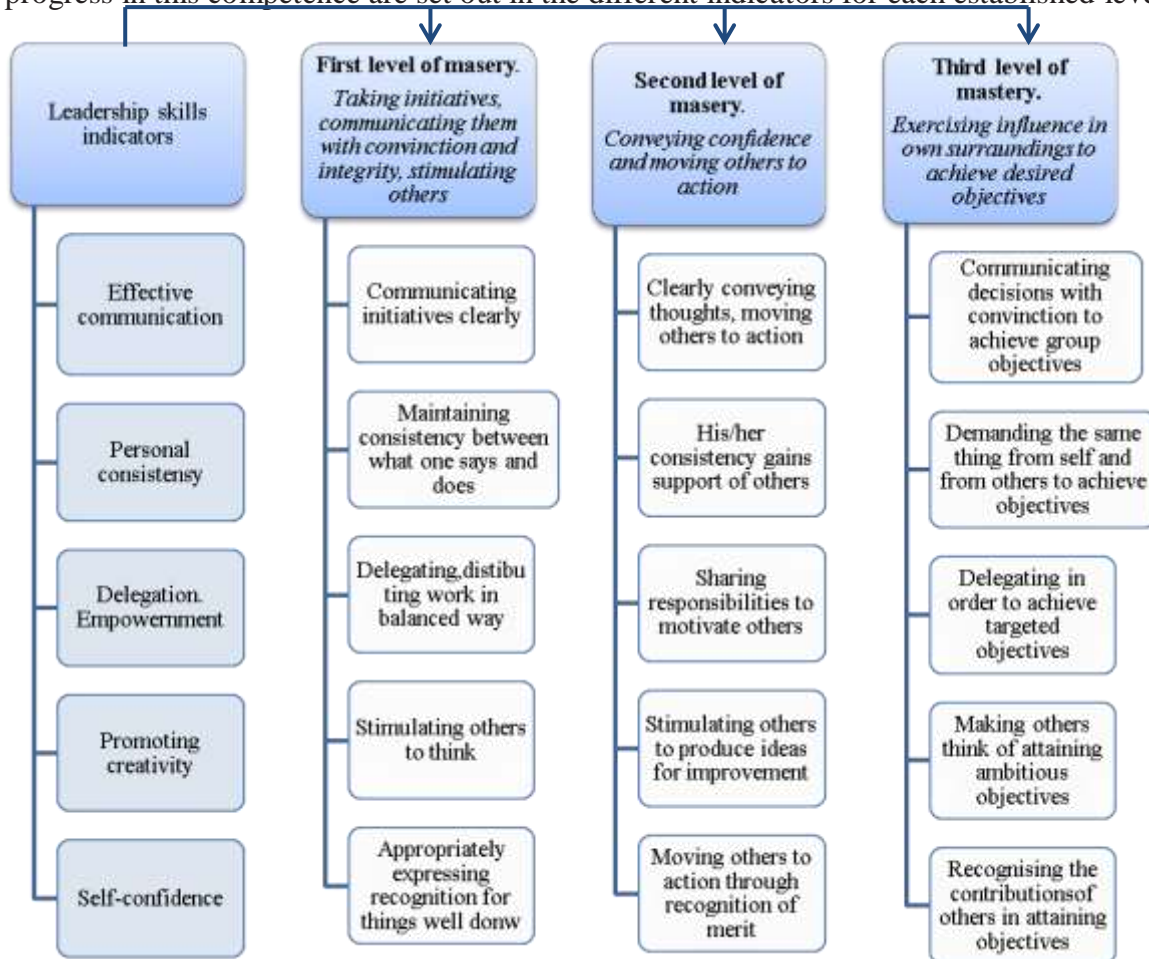


Fig 1. The assessment criteria of leadership skills

Engineering leadership in academic curriculum. It is generally known, that leader development is mainly an individual process. In addition it is important to understand that each leader brings to the situation a unique level of prior development attained by genetics, childhood upbringing, and adult experiences [13]. According to Fredrickson's broaden-and-build theory, those individuals who have more positive psychological resources are expected to grow more effectively or to broaden themselves and build out additional personal resources to perform. The authors of authentic leadership theory admit that the life and work environment is much more important than heritability in predicting leadership emergence across one's career. However, the potential of everyone to become a better and more effective leader is emphasised in the most research.

Leadership as a competence can be developed rather through assigned group or teamwork activities than having individual and independent tasks [11]. It can be provided in industry in the form of training master-classes, which has been proven to be an effective way

to create a high-quality professional team [14]. However, except for large corporations, few companies offer these formal leadership-training programs.

Traditional civil engineering education prepare undergraduate and graduate students to master their technical skills in a specific engineering tasks without much time devoted to discussion and for leadership practice. In addition, engineering curriculums at many universities are so demanding technically that students don't have the time or inclination to pursue business courses. Therefore, to obtain soft skills, either the students should take additional courses (something they are not apt to do because of the time and money commitments), or the existing engineering curricula need to be modified to prepare the demands of today's competitive global market.

Modern engineering courses have little or no project management experience in professional practice. As a result, graduates feel lack of knowledge and experience to learn the basics of project management and leadership. Considering the limitation on additional courses in an engineering curriculum, it is significant to realise the crucial role of leadership skills in the engineering study process and count this to modern curricula correspondently.

Teaching methods for leadership development. Leadership training in the academic helps students to assume personal and group responsibilities which would otherwise be difficult to promote and evaluate. However, one of the main challenge in leadership development in engineering courses is the fact that this

Traditionally, civil engineering courses have been taught in a straightforward way, starting with a lot of definitions, basic concepts, and methods for solving well-defined problems, which in most cases are simplified and idealized [15]. In most of the basic civil engineering courses, the instructors provide just the necessary parameters to solve an idealized problem that includes an algorithmic procedure to efficiently solve the problem. Even though, it is necessary to provide the students with basic principles and formulas needed to make judgments, this way of teaching is not sufficient to produce engineering leaders. Problem-based learning is a well-accepted and effective way to develop leadership skills. It challenges students to study while solving real-world problems, working in groups and learning from each other. The main teaching methods to develop leadership skills of potential engineers are presented in table 1.

Table 1.

Teaching methods to develop civil engineer's leadership skills

Teaching strategies	Students activities	Types of tasks
teaching as facilitating, discussion occurs in classes, but mostly learning occurs outside the classroom, teacher coaches students when needed and directs their learning, engages students in the process of critical thinking, inviting coaches from industry who are successful leaders as well as engineers, and who understand the importance of cultivating young leaders. service learning pedagogy methods	group works at the same project, fulfilment of duties under the certain "posts", which are rotating during the course, focus on outstanding communication internships with industry, self- and peer-assessment to determine their comfort with addressing and accepting change and seek input from their peers and advisors on the same. work on real-world projects in real engineering environment	real-world projects and tasks with technical complexity similar to the real engineering projects, writing detailed proposals and project reports similar to those written by practicing engineers, writing a detailed and professional feedback of both the course and activities.

Another way to boost the level of practical engineering knowledge is service learning. It is a proven fact that students learn more effectively when they receive education

complemented with experiments or hands-on training. Traditionally, pedagogies based on hands-on training include at least one or a combination of laboratory experiments, undergraduate research experiences, internships, and cooperative experiences. Instructors can also use field trips to provide practical applications to engineering education. This approach to engineering education, which is inherent in technical high education [16] in soviet and post-soviet countries, has been proven to be very effective. However, it still does not help students to independently cope with even a small project. Another modern pedagogical technique, service learning, involves integration of several components and partnership among several players, such as the community, practicing factories, students, and faculty. Service-learning pedagogy provides students an opportunity to work on real-world projects, giving students the opportunity to take the initiatives in challenging situations and exercise leadership in more natural way.

Results. The above mentioned teaching methods and strategies have been tested on 3-4-years the students in O. M. Beketov National University of Urban Economy in Kharkiv during the courses “Aerodynamics of ventilation”, “Ventilation” and “Air-conditioning”. 91 students participated in the survey, the results of which are presented in the table 2.

Table 2.

Assessment of influence of teaching environment to the students

Quality of the students' responses	Positive responses	% from the whole amount of responses
The influence of the course content to the student's personality		
The course directly affected the leadership skills	62	69
Understood the essence of leadership	58	64
Realised the significance of modelling and troubleshooting skills in leadership	53	59
Realised the level of their own leadership skills development	79	87
Recognised the main obstacles to achieve the required leadership skills	77	85
Realised the importance of the ethics in leadership	66	73
Assessment of the teaching environment		
High level of the teaching environment	63	70
The scientific information is enough, well-organised and easy to comprehend	71	79
The students have the opportunity to express their thoughts and creativity	75	83
Sustainable interaction and effective feedback	77	85
The influence of the teaching environment to physiological state of the student		
Ability for the students to be active during the lessons	61	68
Increased cognitive activity of the students	65	72
Increased emotional and psychological state of the students	69	77
Students are not indifferent to the subject	62	69

Conclusions and perspectives of the research. Leadership is a competence and as such it can be acquired, developed and polished effectively in academic environment. Currently, the criteria of leadership for civil engineers are getting clearer, which allows educators to develop proper curricula and teaching strategies. In addition, it is critical to apply active teaching method and modern facilities to create an essential environment for team working and leadership development. The results of the survey revealed the significance of leadership skill development in teaching practise and high influence of the course structure on it. The implementation of the new approach, where both students and staff are involved, has been monitored and assessed carefully. The future improvement of the tested approach should correlate to trends in student development throughout the course. A parallel need is to monitor the syllabus content and assessment methods, which can be as monotonous and ineffective as the traditional versions. It is important to recognise that there is potential for competence and incompetence in all teaching methods and programmes. The presented competence-based approach to develop leadership skills together with the planned improvements should go part of the way towards achieving the aspirations of both engineering educators and teaching and learning professionals.

Research of conditions, technology, methods and forms of shaping such a leader and employment of their potential to form future competitive engineers are perspective.

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